Medical Science

Assessment of eating disorder and obesity among youth in Saudi Arabia

Rakesh Tomar✉, Varghese C Antony

Author Affiliation:
King Fahd University of Petroleum & Minerals, Saudi Arabia

✉**Corresponding author**
King Fahd University of Petroleum & Minerals,
Saudi Arabia
Email: rtau@rediffmail.com

ABSTRACT

Objectives of the present study were; to compare the eating disorders among different classes of obesity; to study the association of eating disorder with sleep, smoking, meal and physical activity; and to investigate the relationship of obesity with eating disorders. We divided 55 selected participants into three different groups of obesity; Obese Class I ($30 < 35$ kg/m²), Obese Class II ($35 < 40$ kg/m²) and Obese Class III (≥40.00 kg/m²). We administered Eating Disorder Examination Questionnaire (EDE-Q) to all participants. Demographic data was collected through online questionnaire. To compare EDE-Q scores, one-way anova was employed. To examine association of EDE-Q with sleep, meal habits, smoking and physical activity, Chi Square was used. To investigate relationship between relationship obesity and eating disorders, Pearson product moment correlation was used. There was no significant difference in EDE-Q obese groups, $F(2.52) = 0.247$, $p = 0.782$. Our analysis could not establish any significant relationship between Obesity and EDE-Q ($r= -0.11$, $n=55$, $p= 0.938$). No significant association was seen between eating disorder and physical activity $X(1) = .582$, $p=0.748$; smoking $X(1) = .004$, $p=0.947$; sleep $X(1) = .845$, $p=0.362$; and meal status $X(1) = 1.331$, $p=0.514$. It can be concluded that although no significant difference was seen in EDE-Q but in all three obese classes EDE-Q scores were on higher sides. No correlation seen between obesity and EDE-Q.

Keyword: Obesity, Eating Disorder, Physical Activity

1. INTRODUCTION

Eating disorders are not strange phenomenon and are quite prevalentand common health condition among adults. It can affect population of different ages and weights (Hey et al., 2008; Hay, 1998; Ghafouri et al., 2021). According world health organization, in past two decades prevalence of obesity has reached to the level of epidemic proportions across number of developed nations of the world (WHO, 2000). Obesity and eating disorders, both are matter of concern having seriouseffect on students of universities (American College Health Association, 2007; Eisenberg et al., 2011; Racette et al., 2005).

Students in colleges have higher chances of exposure to unhealthy eating habits, which may lead to gain in their body mass (Mehrdad et al., 2015). Within the college population, a high risk of body image and eating disorders

has been found and is on the rise. Lifestyle factors found to be associated with the abnormal attitudes towards along with disordered eating (Calvo et al., 2002). The dramatic change in lifestyle and behavior among high school to college going population was a factor that had influenced the risk of increasing weight and disrupt patterns of eating patterns among students (Pritchard and Wilson, 2005; Malinauskas et al., 2006). The living environment plays a crucial role towards normal eating habits. Those students living with their families tend to have more regularity in their meals than those who are not (Neumark-Sztainer et al., 2003).

In France eating disorders are quite prevalent among students of universities and it is associated with other risk factors like depression and stress (Tavolacci et al., 2015). The disturbances in sleep, depressed mood and the stress could be associated with abnormal behaviors of eating along with weight concerns (Camatta et al., 1995; Costa et al., 2010; Delinsky et al., 2008; Depner et al., 2014; Eller et al., 2006; Rawson et al., 1994). It was found in a study done in Saudi Arabia, that every fourth male adult were obese (Memish et al., 2014). In the Kingdom of Saudi Arabia, most important factors that contribute towards the onset of obesity was lack of regular physical activities along with imbalanced diet (Al-Baghli et al., 2008; Horaib et al., 2013; Amin et al., 2008; Al Hazzaa et al., 2012). To encourage students for physical activities small sided recreational football and basketball can be encouraged as an alternate activity for health improvement among untrained males (Tomar and Antony, 2019). It was recommended in one of the studies done in Saudi Arabia to use small a side recreational football to bring effective change in physical and physiological responses in untrained males (Tomar and Antony, 2019a). Another study done in Saudi Arabia found alarming high number (49.1%) of undergraduate students either as obese of overweight (Antony and Tomar, 2016).

Therefore, looking at the reviews, and perceiving the importance of eating disorders in student population, we examined and assessed eating disorders in young male students of a university in Saudi Arabia. Purpose of this study was to compare the Eating Disorders among different categories of obesity. Another purpose was be to find out the relationship between obesity and eating disorders and also to examine the association of physical activity, sleep, smoking and meal habits with eating disorders.

2. MATERIALS AND METHODS

Participants

Participants were male undergraduate students from King Fahd University of Petroleum & Minerals. We randomly selected 60 participants with Body Mass Index (BMI) ≥ 30 kg/m². Online questionnaires (EDE-Q and IPAQ-S) were sent to all 60 participants. Fifty-five students returned both questionnaires completed in all aspects. Hence, 5 students with incomplete responses were removed from the study. The age of the students ranged from 18 - 25 years. On the basis of self-reported BMI, and according to Center for Disease Control and Prevention, three obese categories were formed; Obese Class I (30 < 35 kg/m², Obese), Obese Class II (35 < 40 kg/m², Severely Obese) and Obese Class III (≥40.00 kg/m², Morbidly Obese) (CDC, 2021; Weir, 2019; National Heart, Lung and Blood Institute, 2021).

Study Design

The participants were asked to provide demographic details (name, age, height, weight, time spent on physical activity, smoking habits, hours of sleep, and meal habits). Testing procedure was explained to all the participants and queries if any were clarified. A written informed consent was obtained prior to the enrolment and confidentiality was ensured. This study is approved by Research Committee of King Fahd University of Petroleum and Minerals (Approval Code IN191040, 29 March, 2020). Exclusion Criteria were: anyone who did not complete minimum one semester in any undergraduate program, participants, who are undergoing body image or obesity-related therapy were excluded from the study. Students were asked to complete the online questionnaire for eating disorder (EDE-Q) and physical activity (IPAQ-S). Both questionnaires were provided to the participants through google forms. Questionnaire was sent to participants through emails with link. Weekly reminder emails were sent to all participants.

Measuring Tools

Eating Disorder

The Eating Disorder Examination Questionnaire (EDE-Q) (Fairburn and Beglin, 2008) was used to measure eating disorders among obese students. EDE-Q is a self-report instrument containing 28 items, and is meant to assess eating disorders from an attitude and behavioral aspects over a period of 28-days. The EDE-Q consists of 4 subscales; Restraint (5); Shaping Concern (8); Weight Concern (5) and Eating Concern (5). The average of each subscale score was recorded and average of all four subscales considered as global EDE-Q score.

Physical Activity

International Physical Activity Questionnaire (IPAQ-S), a shorter version was employed measure the physical activity status of participants. IPAQ-S short form was a 7 items self-reported questionnaire which measures the intensity and frequency of physical activity (www.ipaq.ki.se).

Statistical Analysis

To assess the status of students' eating disorders mean and standard deviation were computed. To determine the significance of difference among obese groups and eating disorders, ANOVA test was carried out to report the significant mean difference. Correlation co-efficient was used to measure the relationship between obesity and eating disorders. Association between demographic qualitative variables was analyzed by Chi-square. The statistical analyses were performed by SPSS version 24.0. The significance level was set at .05 levels.

3. RESULTS

Demographic and other characteristics

Mean age and BMI of participants were 19.67 ± 0.90 and 34.98 ± 4.47 respectively. Based on BMI participants were categorized into Obese Class I (30< 35); Obese Class II (35<40) and Obese Class III (≥40). Out of total 55 participants, 26 (47.3%) participants were in Obese class 1; 18 (32.7%) in obese class II and 11 (20%) in Obese class III. Descriptive statistics based on different obese categories were presented in Table 1. Majority of participants (89.1%) in present study were not smoking. Half of the participants (50.9) were taking three meals daily while 34.5% participants reported taking more than 3 meals every day. With regard to sleep, majority of participants (70.9%) reported having sufficient sleep (≥7 hours). Participants were not active enough in current study. More than half of the participants (56.4%) were low active and only 7.3% were highly active. Mean EDE-Q Global score in this study was 2.50±0.91.

Table 1 General and Demographic Characteristic of Participants

Participants Characteristics	Obese Class I BMI (kg/m²) (30 < 35)	Obese Class II BMI (kg/m²) (35 < 40)	Obese Class III BMI (kg/m²) (≥40)	Total
Participant's n (%)	26 (47.3)	18 (32.7)	11 (20)	55
Mean BMI	31.02±0.96	38.74±1.37	41.93±2.17	34.98 ± 4.47
Age (Mean ± SD)	19.61±0.63	19.83±1.24	19.54±0.82	19.67 ± 0.90
Smoking Status n (%)				
No Smoking	21(80.8)	17(94.4)	11(110)	49 (89.1)
Smoking	5(19.2)	1(5.6)	0(0)	6 (10.9)
Meal Status n (%)				
> 3 Meals	11(42.3)	5(27.8)	3(27.3)	19 (34.5)
3 Meals	12(11.5)	11(61.1)	5(45.5)	28 (50.9)
<3 Melas	3(46.2)	2(11.1)	3(27.3)	8 (14.5)
Sleep Status n (%)				
>7 hrs Insufficient Sleep	7(26.9)	3(16.7)	6(54.5)	16 (29.1)
≥7 hrs Sufficient Sleep	19(73.1)	15(83.3)	5(45.5)	39 (70.9)
Physical Activity n (%)				
Low Active	11(42.3)	12(66.7)	8(72.7)	31 (56.4)
Moderate Active	13(50)	4(22.2)	3(27.3)	20 (36.4)
Highly Active	2(7.7)	2(11.1)	0(0)	4 (7.3)
MET Minutes Per Week	674.03±1006.54	601.55±939	439.63±459.58	603.43±890.97
EDE-Q Data				
EDE-Q Global Score	2.59±0.96	2.42±0.90	2.41±0.86	2.50±0.91
Restraint Subscale	1.97±1.52	1.51±0.97	2.2±1.79	1.86±1.42
Eating Concern Subscale	1.58±1.13	1.87±1.30	1.38±1.01	1.64±1.16

Shaping Concern Subscale	3.37±1.41	3.4±1.25	3.13±1.25	3.35±1.31
Weight Concern Subscale	2.9±1.23	2.35±1.12	2.5±0.92	2.64±1.15

Data is shown as mean ± standard deviation

Categorical variables were shown as frequency (percent)

N number of participants

Comparison of EDE-Q among three classes of obesity

Table 2 & figure 1 shows the comparison of EDE-Qamong different categories of obesity. Participants in three obese groups were demographically similar with no significant difference inage, $F_{(2.52)} = 0.436$, $p = 0.649$. ANOVA revealed no significant difference for EDE-Q Global score between categories of obesity, $F_{(2.52)} = 0.247$, $p = 0.782$. Further No significant difference was found for scores of EDE-Q sub scales between obese categories. Restraint sub scale, $F_{(2.52)} = 0.934$, $p = 0.400$, Eating Concern Subscale, $F_{(2.52)} = 0.670$, $p = 0.516$, Shaping Concern Subscale, $F_{(2.52)} = 0.211$, $p = 0.811$ and Weight Concern Subscale, $F_{(2.52)} = 1.296$, $p = 0.282$.
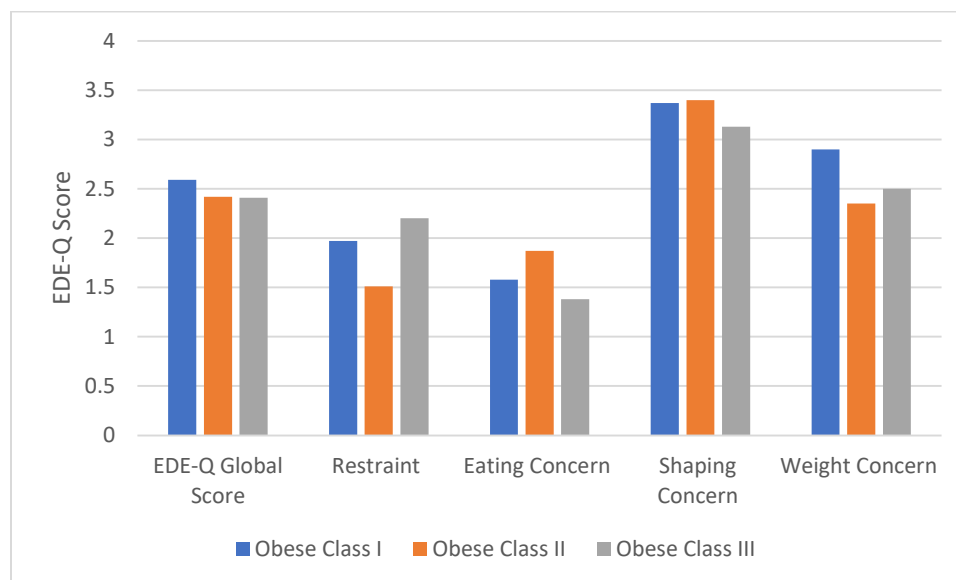

Figure 1 Mean EDE-Q Score for Different Categories of Obesity

Table 2 ANOVA, Comparison of Eating Disorders among different obese category

Variable	Obese Class I	Obese Class II	Obese Class III	P Value
EDQ Global Score	2.59±0.96	2.42±0.90	2.41±0.86	0.782
Restraint Subscale	1.97±1.52	1.51±0.97	2.2±1.79	0.40
Eating Concern Subscale	1.58±1.13	1.87±1.30	1.38±1.01	0.516
Shaping Concern Subscale	3.37±1.41	3.4±1.25	3.13±1.25	0.811
Weight Concern Subscale	2.9±1.23	2.35±1.12	2.5±0.92	0.282

Relationship of Obesity with Eating Disorder

To examine relationship between eating disorder and obesity, Pearson product moment correlation was employed. After analyzing data, we could not find significant relationship between EDE-Q Global Score and BMI ($r= -0.11$, $n=55$, $p= 0.938$).
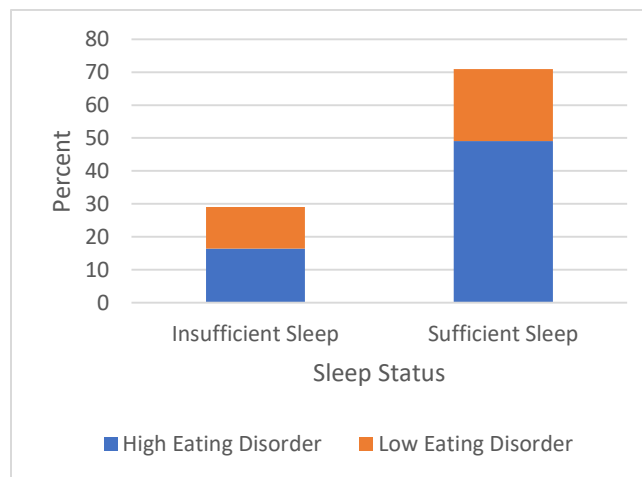
Association of Physical Activity, Sleep, Smoking and Meal Status with Eating Disorder

Chi square was used to find association of physical activity (PA), Sleep, smoking and Meal status with EDE-Q. The statistical analysis of data could not establish any significant association of PA, $X_{(1)} = .582$, $p=0.748$; smoking $X_{(1)} = .004$, $p=0.947$; sleep $X_{(1)} = .845$, $p=0.362$; and number of meals $X_{(1)} = 1.331$, $p=0.514$; with eating orders among obese individuals. Chi Square was presented in Table 3. Majority of participants (65.5%) had score high on EDE-Q. Data in Table 3 shows highest number of participants (34.5%) with high eating disorder were in moderately active group. With regard to smoking majority of non-smokers (58.2%) were having

high eating disorder in this study. Interestingly only (7.3%) participants who are consuming more than three meals a day were having high eating disorder. Majority of participants (49.1%) who were getting more than 7 hours sleep had reported signs of high eating disorder (Table 3, Fig. 2, 3, 4 and 5).

Table 3 Association of Physical Activity, Sleep, Smoking and Meal Status with Eating Disorder (Chi Square)

|	High Eating Disorder, *n (%)*	Low Eating Disorder, *n (%)*	*P Value*
Overall	36(65.5)	19(34.5)	
Physical Activity			
Highly Active	3 (5.5)	1(1.8)	
Moderate Active	19(34.5)	12(21.8)	0.748
Low Active	14(25.5)	6(10.9)	
Smoking			
Non-Smoking	32(58.2)	17(30.9)	0.947
Smoking	4(7.3)	2(3.6)	
Meal Status			
<3 Melas	12(21.8)	7(12.7)	
> 3 Meals	4(7.3)	4(7.3)	0.514
3 Meals	20(36.4)	8(14.5)	
Sleep Status			
>7 hours Insufficient Sleep	9(16.4)	7(12.7)	0.358
≥7 hours Sufficient Sleep	27(49.1)	12(21.8)	

Figure 2 Association of Eating Disorder with Sleep Status
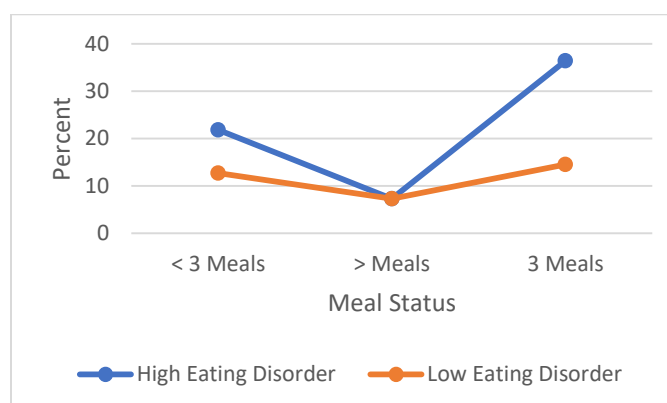
Figure 3 Association of Eating Disorder with Meal Status
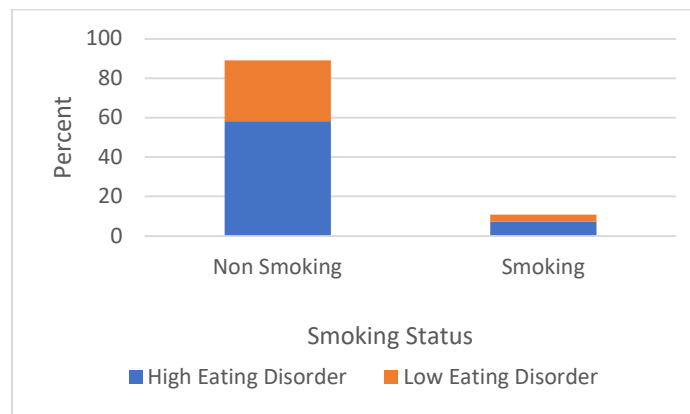
Figure 4 Association of Eating Disorder with Smoking Status
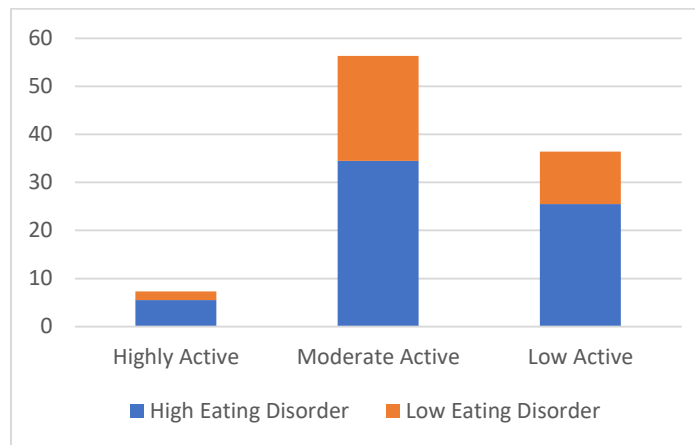
Figure 5 Association of Eating Disorder with Physical Activity

4. DISCUSSIONS

The EDE-Q is a widely used questionnaire across the globe for the assessment and examination of eating disorders. In our study of 55 undergraduate males, we found high EDE-Q Global score and sub scale scores. Mean EDE-Q Global score in present study (2.50) is quite higher than mean EDE-Q global scores when compare to previous studies (Carey et al., 2019; Quick et al., 2013; Reas et al., 2013; Lavender et al., 2010; Hilbert et al., 20212; Mond et al., 2004; White et al., 2014; Rose et al., 2013). EDE-Q Global Score in our study is lower than previous study done by Jennings et al in males (Jennings et al., 2017). The cut off EDE-Q global score is (2.30) (White et al., 2014), which is a validated threshold that can be utilized to identify eating disturbances. Using this cut off score, we identified more than 65.5% of youth in our study with eating disturbances. The cut off mark (≥4) is used as mark of clinical significance (Jennings et al., 2017; Meule, 2019); in present study only two participants (3.63%) breached the cut of mark for clinical significance.

In present study, we could not find significant differences in EDE-Q global score and its subscale among different categories of obesity. Scores in all three categories were quite similar to each other. Probable reason could be similarity in culture and eating patterns of the participants. Further there was no significant relationship between obesity and eating disorders. This could be because of shortcomings in self-reporting by the participants, while self-reporting participants may overestimate and under estimate psychopathology (Hilbert et al., 2012). Furthermore, no significant association was found between physical activity and eating disorders. But our data suggest that majority of participants in all three activity groups were having higher EDE-Q scores. If we explore further, greater number of participants with higher EDE-Q score were in low and moderate active groups. Our results were to some extent consistent with previous study where non-athletes were found to be at greater risk for eating disorders (Di Bartolo et al., 2002); all participants in our study are non-athletes. There was interesting finding reported in previous study that athletes, who had higher rates of activity than lower active non-athletes, had a higher prevalence of eating disorders (Hausenblas and Mcnally, 2004). In our study also, in highly active group 3 (75%) participants score high on EDE-Q score which is line with previous study on college athletes and non-athletes (Hausenblas and Mcnally, 2004). Most of the students in present study were

enrolled in freshman course and 65.5% participants scored high on EDE-Q global score. This was consistent with study done by Blair et al., (2017) where they found students in freshman course were at higher risk for eating disorders and along with body shape dissatisfaction.

With regard to sleep, we could not find its significant association to eating disorders, which was not in line with previous study where authors found association of fewer sleeping hours with abnormal eating attitude among students (Makino et al., 2006). In the literature also, there were very few studies and reports on association of sleep with eating disorders. Students who are having reduced sleeping hours were exposed to more opportunities to eat (Makino et al., 2006). However, in our study students (49.1%), who slept more than seven hours per night, had higher EDE-Q score. There was no significant association of meals with eating disorder in present study. Our findings were not supported by previous study which suggests that irregularity in meals was associated with abnormal eating attitude (Makino et al., 2006). Data in some previous studies reflect that the number of meals taken in a day was inversely related to obesity (Monello et al., 1965; Metzner et al., 1977).

In present study participants (36.4%) with regular meals (3 meals/day) had higher EDE-Q score. According to a Japanese study performing exercise twice a week or more was found to be associated with abnormal eating behaviors (Makino et al., 2006). Our data also suggest that EDE-Q score was higher in moderately active students than low active some more previous established relationship of abnormal eating attitudes with exercise (Shefer, 1987; Johnson-Sabine et al., 1988; McDonald and Thompson, 1992; Garner et al., 1982; Seigel and Hetta, 2001; O'Dea and Abraham, 2002; Augusted and Flander, 2002). There was no significant difference seen between smoking and eating disorders in present study. Majority of students in our study were not smoking (89.1%). Percentage of non-smokers was similar to earlier study conducted on university males in Saudi Arabia (Tomar et al., 2015). Most of these non-smoking students (58.2%) were having high eating disorders. Our results are not in line with previous studies association of smoking was seen with eating disorders (Halek et al., 1983; Gerend et al., 1998; Serdula et al., 1999; Croll et al., 2002).

Limitations

There were few limitations in our study which should consider while interpreting the results. In present study we used convenience sampling, therefore generalization of results was not recommended. We recommend conducting studies with sample which is more heterogenous in nature. The objective of our study was to have some homogeneity in sample especially in terms of the age so that we could have a better reliability while comparing EDE-Q scores among different categories of obesity.

5. CONCLUSIONS

The university students in all the three obese categories exhibited high scores on EDE-Q, but no significant difference was reported. The results indicated that no correlation was found between obesity and eating disorder. Interestingly, all physical activity groups had high EDE-Q scores. No significant association was found between physical activities and eating disorders. Awareness regarding eating disorders should be emphasized among youth of Saudi Arabia. All obese group students should be encouraged to do physical activity regularly. Further interventional studies are needed for a better understanding of eating disorders.

Authors Contribution

Rakesh Tomar: Principal Investigator

Varghese C Antony: Co-Investigator

Conflicts of interest

The authors declare that they have no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Albaghli NA, Alghamdi AJ, Alturki KA, Elzubaier AG, Alameer MM, Albaghli FA. Overweight and obesity in the eastern province of Saudi Arabia. Saudi Med J 2000; 29(9):1319-25.

2. Alhazzaa HM, Abahussain NA, Alsobayel HI, Qahwaji DM, Musaiger AO. Lifestyle factors associated with overweight and obesity among Saudi adolescents. BMC Public Health 2012; 12(1):1-1.

3. American College Health Association. American college health association national college health assessment spring 2006 reference group data report (abridged). J Am Coll Health 2007; 55(4):195.

4. Amin TT, AlSultan AI, Ali A. Overweight and obesity and their relation to dietary habits and socio-demographic characteristics among male primary school children in Alhassa, Kingdom of Saudi Arabia. Eur J.Nutr 2008; 47(6):310.

5. Antony VC, Tomar R. A comparative analysis of participation motivation to physical activity and sports among university students. J Sport and Health 2016; 7(1):2-13.

6. AugestadLB, Flanders WD. Eating disorder behavior in physically active Norwegian women. Scand J Med Sci Sports 2002; 12(4):248-55.

7. Blair L, Aloia CR, Valliant MW, Knight KB, Garner JC, Nahar VK. Association between athletic participation and the risk of eating disorder and body dissatisfaction in college students. Int J Health Sci 2017; 11(4):8.

8. Calvo VI, Aroca PJ, Armero F, Diaz G, Rico H. Life-style in eating behavior disorders. Nutr Hosp 2012; 17: 219–222

9. Camatta CD, Nagoshi CT. Stress, depression, irrational beliefs, and alcohol use and problems in a college student sample. Alcohol Clin Exp Res 1995; 19(1):142–146.

10. Carey M, Kupeli N, Knight R, Troop NA, Jenkinson PM, Preston C. Eating Disorder Examination Questionnaire (EDE-Q): Norms and psychometric properties in UK females and males. Psychol 2019; 31(7):839

11. CDC, https://www.cdc.gov/obesity/adult/defining.html, Accessed 13 Sep 2021

12. Costa LD, de Vasconcelos FD, Peres KG. Influence of biological, social and psychological factors on abnormal eating attitudes among female university students in Brazil. J Health Popul Nutr 2010; 28(2):173.

13. Croll J, Neumark-Sztainer D, Story M, Ireland M. Prevalence and risk and protective factors related to disordered eating behaviors among adolescents: relationship to gender and ethnicity. J Adolesc Health 2002; 31(2):166-75.

14. Delinsky SS, Wilson GT. Weight gain, dietary restraint, and disordered eating in the freshman year of college. Eat Behav 2008; 9(1):82-90.

15. Depner CM, Stothard ER, Wright KP. Metabolic consequences of sleep and circadian disorders. Curr Diab Rep 2014; 14(7):1-9.

16. DiBartolo PM, Shaffer C. A comparison of female college athletes and nonathletes: Eating disorder symptomatology and psychological well-being. J Sport Exerc Psychol 2002; 24(1):33-41.

17. Eisenberg D, NicklettEJ, Roeder K, Kirz NE. Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. J Am Coll Health 2011; 59(8):700-7

18. Eller T, Aluoja A, Vasar V, Veldi M. Symptoms of anxiety and depression in Estonian medical students with sleep problems. Depress. Anxiety 2006; 23(4):250-6.

19. Fairburn CG. Cognitive behavior therapy and eating disorders. Guilford Press; 2008 Apr 21.

20. Garner DM, Olmsted MP, Bohr Y, Garfinkel PE. The eating attitudes test: psychometric features and clinical correlates. Psychol Med 1982; 12(4):871-8.

21. Gerend MA, Boyle RG, Peterson CB, Hatsukami DK. Eating behavior and weight control among women using smokeless tobacco, cigarettes, and normal controls. Addict Behav 1998; 23(2):171-8.

22. Ghafouri KJ, Qadhi AH, Ghaith MM, Azhar WF, Azzeh FS, Habibullah MM. Eating disorders amongst adolescents in Makkah: Effects of stress and smoking. Medical Science 2021; 25(110):767-775

23. Halek C, Kerry S, Humphrey H, Crisp AH, Hughes JM. Relationship between smoking, weight and attitudes to weight in adolescent schoolgirls. Postgrad Med J 1993; 69(808):100-6.

24. Hausenblas HA, McNally KD. Eating disorder prevalence and symptoms for track and field athletes and nonathletes. J Appl Sport Psychol 2004; 16(3):274-86.

25. Hay P. The epidemiology of eating disorder behaviors: An Australian community-based survey. Int J Eat Disord 1998; 23(4):371-82.

26. Hay PJ, Mond J, Buttner P, Darby A. Eating disorder behaviors are increasing: findings from two sequential community surveys in South Australia. PloS one 2008; 3(2):e1541.

27. Hilbert A, De Zwaan M, Braehler E. How frequent are eating disturbances in the population? Norms of the eating disorder examination-questionnaire. PloS one 2012; 7(1):e29125.

28. Horaib B, Alkhashan HI, Mishriky AM, Selim MA, Alnowaiser N, BinSaeed AA, Alawad AD, Alasmari AK, Alqumaizi K. Prevalence of obesity among military personnel in Saudi Arabia and associated risk factors. Saudi Med J 2013; 34(4):401-7.

29. Jennings KM, Phillips KE. Eating Disorder Examination–Questionnaire (EDE–Q): Norms for a clinical sample of males. Arch. Psychiatr. Nurs 2017; 31(1):73-6.

30. Johnson-Sabine E, Wood K, Patton G, Mann A, Wakeling A. Abnormal eating attitudes in London schoolgirls—a prospective epidemiological study: factors associated with abnormal response on screening questionnaires. Psychol Med 1988; 18(3):615-22.

31. Lavender J, De Young K, Anderson D. Eating Disorder Examination Questionnaire (EDE-Q): Norms for undergraduate men. Eating Behaviors 2010; 11(2):119–121.

32. Makino M, Hashizume M, Yasushi M, Tsuboi K, Dennerstein L. Factors associated with abnormal eating attitudes among female college students in Japan. Arch Womens Ment Health 2006; 9(4):203-8.

33. Malinauskas BM, Raedeke TD, Aeby VG, Smith JL, Dallas MB. Dieting practices, weight perceptions, and body composition: a comparison of normal weight, overweight, and obese college females. Nutrition J 2006; 5(1):1-8.

34. McDonald K, Thompson JK. Eating disturbance, body image dissatisfaction, and reasons for exercising: Gender differences and correlational findings. Int J Eat Disord 1992; 11(3):289-92.

35. Mehrdad N, Abbasi NH, Nasrabadi AN. The Hurt of Judgment in Excessive Weight Women: A Hermeneutic Study. Glob J Health Sci 2015; 7(6):263.

36. Memish ZA, El Bcheraoui C, Tuffaha M, Robinson M, Daoud F, Jaber S, Mikhitarian S, Alsaeedi M, Almazroa MA, Mokdad AH, Alrabeeah AA. Obesity and Associated Factors—Kingdom of Saudi Arabia, 2013 Posted on December 5, 2014

37. Metzner HL, Lamphiear DE, Wheeler NC, Larkin FA. The relationship between frequency of eating and adiposity in adult men and women in the Tecumseh Community Health Study. Am J Clin Nutr 1977; 30(5):712-5.

38. Meule A. Reconsidering the use of cut-off scores for the Eating Disorder Examination–Questionnaire. Eating disorders 2019; 16:1-5.

39. Mond JM, Hay PJ, Rodgers B, Owen C, Beumont PJ. Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. Behav Res Ther 2004; 42(5):551-67.

40. MonelloLF, Seltzer CC, Mayer J. Hunger and satiety sensations in men, women, boys and girls: a preliminary report. Ann N Y Acad Sci 1965; 131(1):593-602.

41. National Heart, Lung and Blood Institute, Classification of Overweight and Obesity by BMI, Waist Circumference, and Associated Disease Risks, http://www.nhlbi.nih.gov/health/public/heart/obesity/lose wt/bmi dis.htm, Accessed 13 Sep 2021

42. Neumark-Sztainer D, Hannan PJ, Story M, Croll J, Perry C. Family meal patterns: associations with sociodemographic characteristics and improved dietary intake among adolescents. J Am Diet Assoc 2003; 103(3):317-22.

43. O'Dea JA, Abraham S. Eating and exercise disorders in young college men. J Am Coll Health 2002; 50(6):273-8.

44. Peñas-Lledó E, Vaz Leal FJ, Waller G. Excessive exercise in anorexia nervosa and bulimia nervosa: relation to eating characteristics and general psychopathology. Int J Eat Disord 2002; 31(4):370-5.

45. Pritchard M, Wilson G. Comparing sources of stress in college student athletes and non-athletes. Athletic Insight: Online J Sports Psychol 2005; 5(1):1-8.

46. Quick VM, Byrd-Bredbenner C. Eating Disorders Examination Questionnaire (EDE-Q): norms for US college students Eat Weight Disord 2013; 18(1):29-35.

47. Racette SB, Deusinger SS, Strube MJ, Highstein GR, Deusinger RH. Weight changes, exercise, and dietary patterns during freshman and sophomore years of college. J Am Coll Health 2005; 53(6):245-51.

48. Rawson HE, Bloomer K, Kendall A. Stress, anxiety, depression, and physical illness in college students. J Genet Psychol 1994; 155(3):321–330.

49. Reas DL, Øverås M, Rø Ø. Norms for the Eating Disorder Examination Questionnaire (EDE-Q) among high school and university men. Eating Disorders 2012; 20(5):437-43.

50. Rose JS, Vaewsorn A, Rosselli-Navarra F, Wilson GT, Weissman RS. Test-retest reliability of the eating disorder examination-questionnaire (EDE-Q) in a college sample. J Eat Disord 2013; 1(1):1-0.

51. Seigel K, Hetta J. Exercise and eating disorder symptoms among young females. Eat Weight Disord2001;6(1):32-9.

52. Serdula MK, Mokdad AH, Williamson DF, Galuska DA, Mendlein JM, Heath GW. Prevalence of attempting weight loss and strategies for controlling weight. Jama 1999;282(14):1353-8.

53. Shefer T. Abnormal eating attitudes and behaviors among women students. S Afr Med J 1987; 72(6):419-21.

54. Tavolacci MP, Grigioni S, Richard L, Meyrignac G, Déchelotte P, Ladner J. Eating disorders and associated health risks among university students. J Nutr Educ Behav 2015; 47(5):412-20.

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55. Tomar R, Al Ameer AH, Antony VC. Life style risk factors and cardiovascular disease: Exploring the knowledge of cardiovascular disease among university teachers in Saudi Arabia. Indian J Sci Technol 2015; 8(33).

56. Tomar R, Antony VC. Effect of small-sided recreational soccer on metabolic controls, lipid profile and physical characteristics in untrained males. Medical Science 2019; 23(100):835-42.

57. Tomar R, Antony VC. Linkage of aerobic capacity and body fat percent: Effects of recreational activity on aerobic capacity, body composition, blood pressure and resting heart rate in University students. Medical Science 2019; 23(98):557-64.

58. Weir CB, Jan A. BMI classification percentile and cut off points. StatPearls Publishing, Treasure Island (FL) 2019

59. White HJ, Haycraft E, Goodwin H, Meyer C. Eating disorder examination questionnaire: Factor structure for adolescent girls and boys. Int J Eat Disord 2014; 47(1):99-104.

60. World Health Organization. Obesity: Preventing and Managing the Global Epidemic. WHO Technical Report Series 894. 2000. WHO: Geneva.

61. www.ipaq.ki.se.